

existing development and overhead transmission lines obscure views from the south looking northeast.

Numerous vantage points for motorists also exist along Highway 128 between Broomfield County line and the site access road. New office buildings along Highway 128 in the vicinity of Jefferson County Airport have or will have views of site facilities. Building 251, turbines, and other site features are visible from Highway 128 west of the site access intersection (see Figure 3-2, photographs 15 and 16).

Boulder County and the City of Boulder jointly own and manage open space north of the project site. Two trailheads are located near the intersection of 93 and 128. The Greenbelt Plateau trailhead is located just east of the intersection along 128. This trailhead provides parking for trails to the north (see Figure 3-2, photographs 17 and 18). The Flatirons Vista trailhead provides parking for hikers headed west (see Figure 3-2, photographs 19 and 20). No trailheads or trails have been provided southeast of the Highway 93/128 intersection. The Colton trailhead is accessible on the north side of Highway 128 about one mile (1.6 kilometers) east of the NWTC entrance off of Highway 128. These trailheads and vantage points along the trails offer users views of the project site and much of the surrounding area.

One residence is located west of Highway 93 across from the aggregate operations. No other residences are located within four miles (6.5 meters) of the site. The view of the NWTC from this residence is dominated by the aggregate facilities located just east of Highway 93.

Highways 93 and 128 are not formally designated scenic roadways by the State of Colorado or local governments.

3.6 WATER RESOURCES

3.6.1 Surface Water

There are no floodplains or substantial permanent surface water resources at the NWTC, and no perennial creeks or streams cross the property. There are a few seeps on the site. Two of these seeps form small perennial ponds. Two ephemeral streams drain the area surrounding the NWTC. Rock Creek flows easterly and is located southeast of the NWTC. Rock Creek flows into Lindsey Pond approximately 1,000 feet (303 meters) east of NWTC. Coal Creek flows to the northeast approximately 400 feet (121 meters) northwest of the NWTC.

Intermittent storms and other seasonal precipitation events may cause water to temporarily collect in topographic drainages. Surface water, when present, is not used for any purpose on or off the site. Off-site ditches convey water throughout the area to various reservoirs and lakes. The closest of these is Church Ditch, approximately 12,000 feet (3,636 meters) southeast of Rock Creek.

Wetlands and related issues are discussed in Sections 3.8 and 4.8 of this document.

3.6.2 Stormwater

The NREL implements a program at the NWTC that identifies procedures to prevent impacts to surface waters resulting from stormwater, as required under its general permit for stormwater

discharge. The procedures are detailed in its "Stormwater Pollution Prevention Program for Construction Activities." The rate of water erosion and the transport of soil and rock on site and in the vicinity are generally low (DOE, 1980).

The general slope of the NWTC is toward the southeast, directing stormwater toward Rock Creek via the natural drainages on the east side of the site. Stormwater runoff from the northwestern corner of the site and stormwater reaching the drainage east of Building 251 discharge toward Coal Creek. Due to the high percentage of undisturbed natural vegetation on the site, most stormwater infiltrates the soil. Based on site reconnaissance, current storm water volumes are not eroding on-site or off-site stream channels.

3.6.3 Groundwater

Precipitation, snowmelt, and water loss from ditches, streams, and ponds located on the alluvium on and near the site are the primary sources of groundwater in the uppermost geologic unit, the Rocky Flats Alluvium. Groundwater flow in the Rocky Flats Alluvium is generally to the east and is controlled by paleochannels and the slope of the underlying bedrock, which is approximately 2 degrees to the east (Woodward-Clyde, 1992). The infiltration rate is on the order of several centimeters per hour (DOE, 1980) and the hydraulic conductivity is estimated to be about 160 feet (48 meters) per year (EG&G, 1994).

Groundwater levels fluctuate with the seasons. A 1983 U.S. Geological Survey map of the depth to water for eastern Colorado shows this area with a water table depth in unconsolidated alluvium ranging from 5 to 20 feet (1.5 to 6 meters). In late 1991, the water table at the site was measured at three monitoring wells at approximately 30 feet (9 meters) below ground surface (Woodward-Clyde, 1992). The alluvium contains stringers of clay that can cause perched water tables of limited extent in some areas. Ponds can be temporarily observed in these areas during spring.

The Laramie-Fox Hills aquifer lies below the Rocky Flats Alluvium and is composed of the lower sandstone unit of the Laramie Formation and the upper unit of the Fox Hills Sandstone. In the western portion of the Denver Basin, these formations are steeply dipping and outcrop west of the NWTC site. Recharge occurs primarily along the exposed bedrock and leakage from adjacent alluvium (DOE, 1980). The groundwater flow is to the east or southeast below the NWTC.

A 1,200-foot (364 meter) water well, identified as WS1, was drilled in 1976 and completed in the Laramie-Fox Hills aquifer to demonstrate that wind-generated electrical power could operate an irrigation system and provide potable water. WS1 was used until 1994 as a source for drinking water, after which time the associated piping was disconnected from the buildings. The static water level (potentiometric surface) in this well seasonally fluctuated. It had been measured at 123 feet (37 meters) (Hamilton Engineering, 1993), and, later in the same year, less than 100 feet (30.3 meters) (Rust, 1993). The irrigation system project was terminated, and information regarding its termination is unavailable.

Groundwater from the site is not currently used for drinking water purposes. Generally, the rights to groundwater resources in Colorado are unrelated to ownership of the land surface. However, for the Denver Basin aquifers (see Section 3.7 – Geology and Soils), which include lower systems, the right to groundwater resources derives from land ownership as long as the water is not tributary to any surface water supplies.

Sewage disposal is addressed with on-site septic tank and leach fields systems (see Section 3.11 Public Services and Utilities).

3.6.4 Groundwater Quality

Groundwater quality at the site has been the subject of studies conducted in 1982, 1989, 1992, and 1993. Samples analyzed in association with these studies indicated that most standards were not exceeded. Water quality analyses conducted in 1982 indicated that the water drawn from well WS1 displayed elevated iron concentration. Although the iron content of the water was approximately three times greater than the State-defined maximum contaminant level (MCL) of 0.3 mg/l, the MCL for iron is determined for visual clarity. There were no adverse impacts to human health resulting from the measured iron concentration level.

Water quality data collected from the 1989-sampling event indicated that some organic compounds, including benzene, toluene, 1,2,4-trimethylbenzene, and xylene, were present, but not in quantities that exceeded State criteria. Trihalomethanes, including chloroform, bromoform, dibromochloro-methane, and bromodichloromethane were also detected. The concentration of chloroform exceeded National Primary Drinking Water Regulation standards; however, chloroform and the other trihalomethanes are common byproducts of water chlorination.

The 1992 study sampled shallow groundwater beneath the NWTC to quantitatively define water quality. Analysis of the results of the study indicated that groundwater quality at the NWTC reflects naturally occurring conditions. Although the concentrations of some metals were elevated, the study concluded the concentrations could be attributed to naturally occurring conditions or well installation operations (Woodward-Clyde, 1992).

3.7 GEOLOGY AND SOILS

3.7.1 Geology

The NWTC is located on the gently sloping terrain of Rocky Mountain Front Range between the Southern Rocky Mountain Province to the west and Great Plains Province to the east. The Front Range trends north south at elevations of approximately 9,800 feet (2,969 meters), with elevations increasing to 13,000 feet (3,939 meters) along the Continental Divide, approximately 16 miles (25.8 kilometers) west of the site. The elevation of the NWTC is approximately 6,000 feet above sea level. The site area consists of a broad, eastward sloping pediment surface developed on coalescing alluvial fans at the mouth of Eldorado Canyon. The NWTC site is located on the western edge of the Denver Basin, an asymmetrical, north-south trending syncline with a steeply dipping western limb and a shallowly dipping eastern limb. Bedrock layers underneath the site dip to the east or northeast at 30 to 90 degrees from horizontal. The Denver Basin proper contains more than 9,840 feet (2,982 meters) of Pennsylvanian to Cretaceous sedimentary deposits.

The topography in the immediate vicinity of the site exhibits an approximate 2% slope to the east-northeast. No streams or creeks traverse the NWTC site. A minor drainage occurs near the eastern boundary. Figure 3-3 illustrates the geologic cross section beneath the NWTC site.